	Research Program	IVV 09-3 Revision: Rev K Effective Date: April 2003
Independent Verification & Validation Facility		

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APPROVAL SIGNATURES		DATE
Gregory Blaney (original signature on file)	QMS Management Representative	04/07/03

REVISION HISTORY			
Rev No.	Description of Change	Author	Effective Date
Initial	Initial Release	Cynthia Calhoun IT/309	08/22/97
A	Added 5.2 Process Verifications. Added NASA Policy Guideline NPG 1441.1 to References. Added section 8 (Metrics). Format and content changes.	Cynthia Calhoun IT/309	04/09/98
B	Format changes	Cynthia Calhoun IT/309	05/05/98
C	Added "Financial Management" section. Added references to 53.IT.0009-4 SLP in section 6.1.7.2. Modified sections 1.0, 6.1.2, 6.1.4.3, 6.1.7.1, 6.1.7.2, 6.1.7.3, 6.1.8, 6.2	Cynthia Calhoun IT/309	07/23/98
D	Quality Record - format change	Cynthia Calhoun IT/309	08/26/98
E	Revised the Resource Manager responsibility. Added the OSMA Annual Review Report, OSMA Software Program Level I Technical Program Plan, and OSMA Software Program Operating Plan as Quality Records. Updated Center Initiative Management Process to reflect the changes in the Level I Technical Program Plan.	Cynthia Calhoun IT/309	04/16/99
F	References to Ames Quality Manual replaced with references to IV&V Facility Quality Manual	Cynthia Calhoun IT/309	09/10/99
G	Reference to Process Verification Work Instruction (IVV 09-3-1) in section 6.2	Cynthia Calhoun IT/309	03/10/00

H	Format and Number changes; Delete Reference to Ames Research Center	Griggs	12/06/00
I	Rewrite of document to reflect refinement of procedure resulting from transfer to GSFC	Shandra Auvil	07/02/01
J	Changed item 6.5	Wesley Deadrick	05/15/02
K	Rewrite to reflect NRA and DDF scope additions	Frank Gmeindl	04/08/03

REFERENCE DOCUMENTS	
Document Number	Document Title
NPG 1441.1	NASA Records Retention Schedules Flowchart
IVV 09-4	Project Management System Level Procedure
IVV 16	Control of Quality Records System Level Procedure
	OSMA Software Program Level I Technical Program Plan
	OSMA Software Program Operating Plan
	Software Assurance NASA Research Announcement
IVV WI 09-3-1	Evaluating research initiatives
IVV WI 09-3-2	Selecting OSMA SARP initiatives
IVV WI 09-3-3	Selecting IV&V Facility research initiatives
IVV WI 09-3-4	Processing procurements for new research initiatives
IVV WI 09-3-5	Processing research deliverables
IVV WI 09-3-6	Conducting research initiative performance reviews
IVV WI 09-3-7	Publishing research results

1.0   Purpose

This procedure establishes guidance for defining and managing the IV&V Facility research program. It also describes the tools and processes utilized to provide continual process improvement of the IV&V Facility Research Program.

2.0   Scope

The scope of this procedure is the IV&V Facility research program. The research program consists of two parts. One part is the day-to-day oversight and management of the Office of Safety and Mission Assurance (OSMA) Software Assurance Research Program (SARP). While the Deputy Associate Administrator for the OSMA (Code Q) sponsors the OSMA SARP, the IV&V Facility is responsible for implementation. The other part is the IV&V Facility's own internally funded research program.

This procedure addresses research program planning, research proposal solicitation, evaluation and selection, research initiative contracting, and research initiative management including the management and publication of results.

2.1.   Research Funding

Figure 2-1 shows the research program funding flow. Although the IV&V Facility manages the entire OSMA SARP for Code Q, Code Q sends funds directly to the Centers. The funds that Code Q sends to the IV&V Facility are for Center Initiatives that the Facility conducts, University Initiatives that are performed by West Virginia University, and Facility management support.

NASA Projects fund the Facility to perform IV&V work. A portion of those funds go into the Director's Discretionary Fund (DDF) and are used to conduct research to improve IV&V.
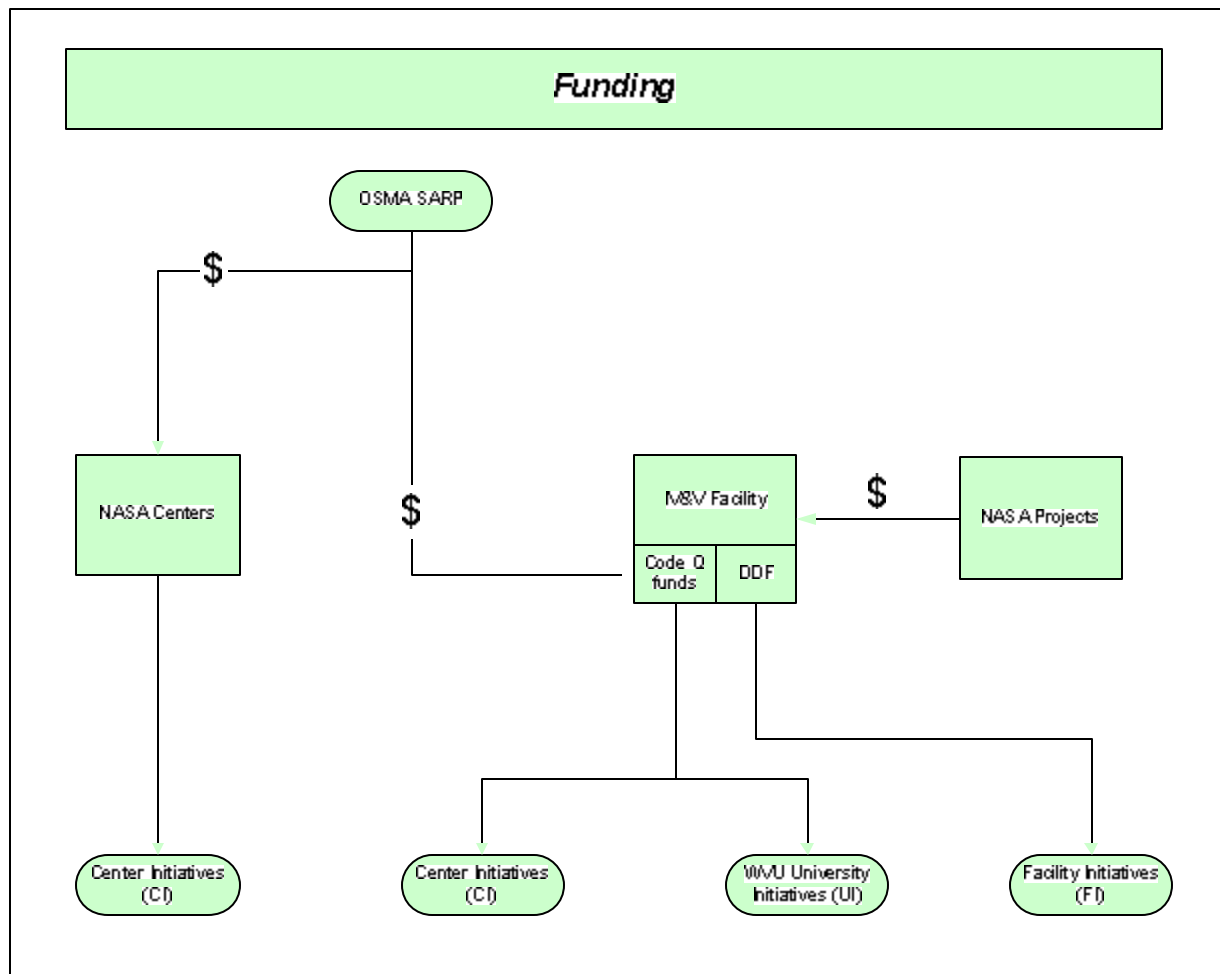
Figure 2-1: Research Funding Flow

2.2. Types of initiatives

The IV&V Facility manages, or has oversight, of three types of research projects:

1. Center Initiatives (CI) – OSMA SARP research conducted at centers or at the IV&V Facility,

2. University Initiatives (UI) – OMSA SARP research conducted by WVU,

3. Facility Initiatives (FI) – IV&V research funded by the Facility DDF.

2.3. Initiative management structure

The IV&V Facility Research Lead oversees all initiatives. Each initiative has a Government Point of Contact (POC) and a Principal Investigator (PI).

The IV&V Facility Research Lead provides oversight to Government POC's and PI's. The Government POC ensures that the PI's work products are accepted by NASA and are retained in the CIM Tool. The PI actually implements the research.

2.3.1. IV&V Facility management of the OSMA SARP
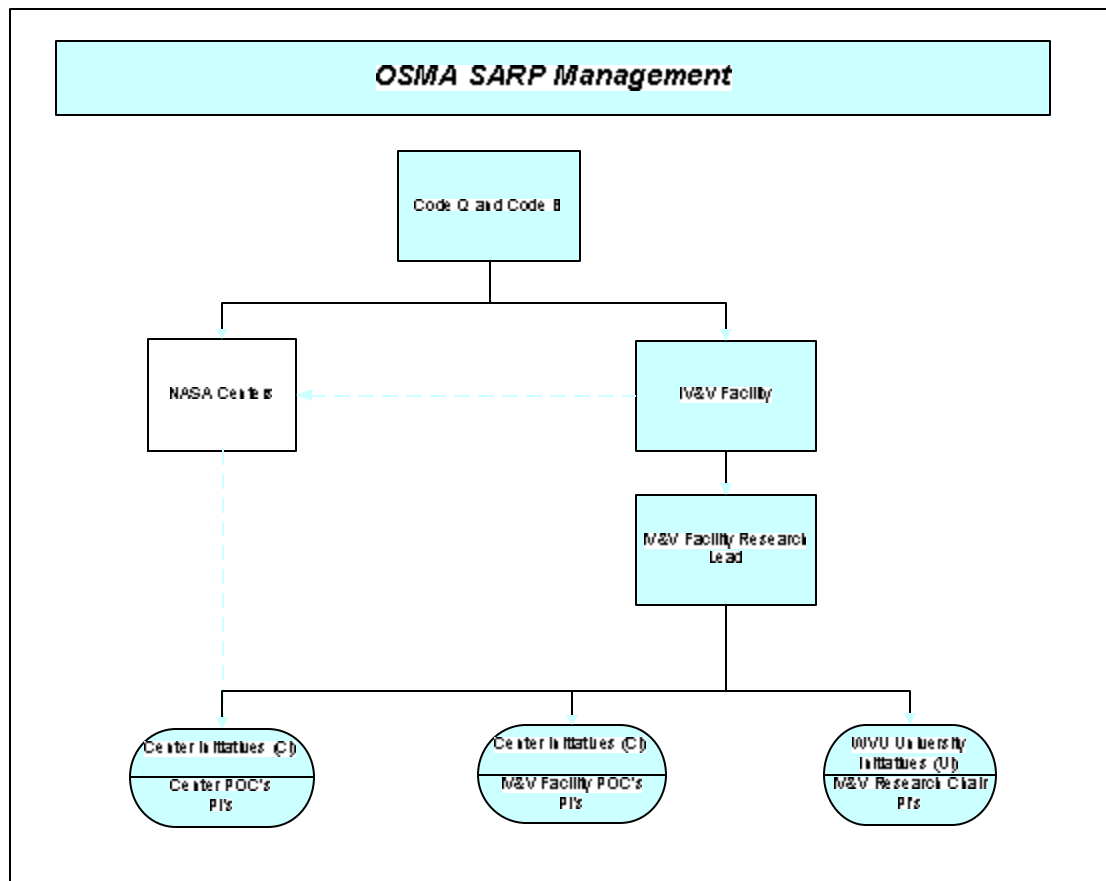
Figure 2-2 shows the OSMA SARP management structure.

Figure 2-2: OSMA SARP Management

The IV&V Facility Research Lead is the Government POC for UI's.

All Government POC's are government civil servants or JPL employees. Government POC's are located at Centers, JPL, or at the IV&V Facility. The Government POC's for the initiatives are stationed at the location that their initiative is located. For example, if Goddard has a research initiative on Code Inspection, the Government POC for that initiative would be located at Goddard.

Initiatives can be performed by civil servants, JPL employees, or contractors. If the initiative is performed by a contractor, the Government POC is usually the Contracting Officer's Technical Representative.

The Centers and JPL have their own contracting offices. For the IV&V Facility, the GSFC procurement office administers grants and contracts. While the Government POC's for IV&V initiatives reside in the IV&V Facility, the Contracting Officer for IV&V initiatives resides at the Goddard Space Flight Center (GSFC).

PI's can be civil servants or contractors. PI's can be located at Centers, JPL, the IV&V Facility, or at contractor sites.

2.3.2. Commonalities between OSMA SARP and DDF funded initiatives

Following are common features of the IV&V Facility's management of the OSMA SARP and DDF research.

- The CIM Tool is the data repository for all initiative proposals, contracts, deliverables and progress reports.

- All initiatives have a designated Government Point of Contact and a Principal Investigator.

2.3.3. Differences between OSMA SARP and DDF funded initiatives

Figure 2-3 is a list of differences between the SARP and the IV&V Facility research initiatives.

	SARP Initiatives	**Facility Initiatives**
Selection Instrument	– Level I plan - POP call – NRA	Unsolicited proposals
Selection Process	Source Evaluation Board	Director and IV&V Research Lead
Management Structure	Code Q delegates day-to-day management to the IV&V Facility	IV&V Facility Director directs
POC locations	NASA Centers IV&V Facility	IV&V Facility only
Initiative types	– CI's – UI's	FI's

Figure 2-3: Differences Between SARP and Facility Initiatives

3.0 Definitions and Acronyms

3.1. Center Initiative (CI)

A project or task funded by the OSMA SARP and focused on software assurance and software improvement. CI's are generally research projects, but certain other projects may be termed CI's on a case by case basis. CI's may be conducted by a NASA Center, JPL, the IV&V Facility, or by another government agency. CI's may also employ the services of a support contractor.

3.2. Center Initiative Management Tool

A web-based data repository used by all program participants to manage initiative work products including proposals, deliverables and status reports.

3.3. Customers

The primary customer for the SARP is the NASA Deputy Associate Administrator for the OSMA, located at NASA Headquarters. Other customers include:

• Researchers funded through this program,

- NASA projects, software developers, and IV&V practitioners who benefit from advances in software assurance technology, and

- The general public who may access the results of this research.

The primary customers of the DDF funded research are IV&V practitioners and the software assurance community.

3.4. Facility Initiative (FI)

A project or task funded by the IV&V Facility DDF and focused on developing IV&V tools and techniques. FI's are generally research projects, but certain other projects may be termed FI's on a case by case basis. FI's are conducted by universities or industry.

3.5. Government Point of Contact (POC)

A civil servant or JPL employee having the authority and responsibility to prepare, implement, and direct a specific research initiative. Each initiative will have a Government POC responsible for the effort. For research performed by a government agency, the Government POC may also be the PI. For research performed by industry or academia, the Government POC is usually the Government Contracting Officer's Technical Representative on the grant or contract through which the industry or academic research is funded.

3.6. IV&V Facility Research Lead

A civil servant at the IV&V Facility who provides oversight to Government POC's and PI's.

3.7. Level I Plan

A high level plan that lays out objectives and processes for OSMA SARP selection and funding of CI's or UI's.

3.8. Level II Plan

A plan that establishes actual funding for approved CI's or UI's and other OSMA SARP activities.

3.9. NASA Research Announcement (NRA)

Solicitation instrument used to obtain research proposals from universities and industry for the OSMA SARP.

3.10. Principal Investigator (PI)

The lead researcher who actually conducts the research. If the PI is a civil servant, the PI may also be the Government POC. However, if the PI is from an commercial or an academic institution, the Government must appoint a separate Government POC.

3.11. Product

A deliverable (either hard copy or electronic) produced by the PI. Typical products include plans, technical reports, software source code and executable code.

3.12. University Initiative (UI)

Specific OSMA SARP sponsored research conducted by WVU under a previously established cooperative agreement.
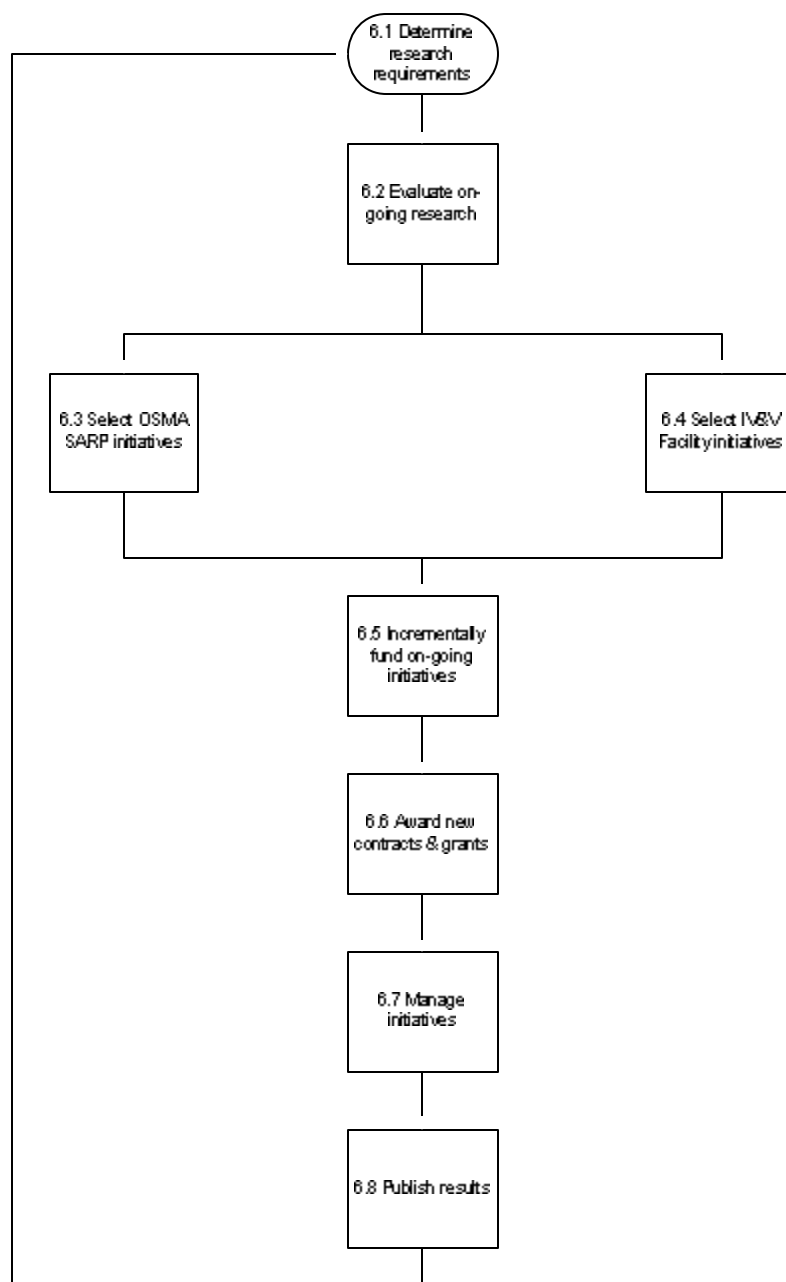
3.13. Acronyms

CI	Center Initiative
CIM	Center Initiative Management
DDF	Director's Discretionary Fund
FI	Facility Initiative
GSFC	Goddard Space Flight Center
IV&V	Independent Verification and Validation
NASA	National Aeronautics and Space Administration
NRA	NASA Research Announcement
OSMA	Office of Safety and Mission Assurance
PI	Principal Investigator
POC	Point of Contact
POP	Program Operating Plan
RCT	Research Coordination Team
SARP	Software Assurance Research Program
SAS	Software Assurance Symposium
SEB	Source Evaluation Board
SLP	System Level Procedures
SRWS	SARP Results Web Site
SWG	Software Working Group
UI	University Initiatives
WVU	West Virginia University

4.0 Flow Chart

5.0 Responsibilities

5.1. Code Q

Code Q (OSMA) provides the funding and delegates the implementation responsibility for the OSMA SARP to the NASA IV&V Facility. Code Q collaborates with the IV&V Facility to establish program direction, evaluate research, determine research objectives, determine initiative funding and select new initiatives.

5.2. IV&V Facility

The IV&V Facility:

- Manages the SARP and its internally funded research program on a day-to-day basis,

- Determines research needs and requirements and provides recommendations to Code Q,

- Evaluates on-going research and provides recommendations to Code Q for incremental funding,

- Drafts research plans, and facilitates the proposal solicitation, evaluation, selection and award process,

- Obtains and processes research deliverables to ensure that research objectives are attained and that research results are disseminated,

- Ensures that research initiatives are properly administered and managed through government POCs.

5.3. NASA Centers

NASA Centers:

- Identify research needs and requirements,

- Provide research proposals and proposal evaluations,

- Incrementally fund on-going initiatives and award new grants and contracts,

- Manage research initiatives through Government POC's.

6.0   Procedure

The following text describes the process steps represented in Figure 4-1: Research Program. The following text also describes the key activities performed within each process step. Further descriptions of many of the steps are contained in work instructions IVV WI 09-3-1 thru IVV WI 09-3-7.

6.1.   Determine research requirements

The IV&V Facility determines OSMA SARP research topics by querying NASA projects, NASA Headquarters personnel, and Software Working Group (SWG) personnel. The IV&V Facility determines IV&V Facility research topics by querying the Research Coordination Team (RCT). The RCT is an IV&V Facility organization consisting of both civil servants and contractors. The RCT meets periodically to review research requirements and facilitate research efforts. The IV&V Facility documents the research topics and posts them on the IV&V web site each year in preparation for the annual proposal solicitation.

6.2.   Evaluate on-going research

The IV&V Facility conducts an annual evaluation of on-going research initiatives to develop funding recommendations for the following year. The annual evaluation is the culmination of numerous evaluations conducted during the year at quarterly reviews, the Software Assurance Symposium (SAS), and other interactions between the research team and NASA.

6.3.   Select OSMA SARP initiatives

Selecting OSMA SARP initiatives involves writing a program plan, soliciting proposals, evaluating proposals, and selecting proposals for award. The IV&V Facility drafts the Level I Plan and Code Q approves it. The Level I Plan serves as the basis for the internal NASA Program Operating Plan (POP) call for research proposals. It also describes a plan to issue a NASA Research Announcement (NRA). The NRA serves as the instrument for requesting research proposals directly from industry and academia. The IV&V Facility also drafts the NRA.

The IV&V Facility receives proposals, obtains evaluations from the SWG and provides recommendations to the Source Evaluation Board (SEB).

The SEB recommends incremental funding for each on-going initiative based on the evaluations of on-going research initiatives. The SEB then recommends new awards based on the proposal evaluation results and the remainder of budgeted funds. Code Q selects proposals for award based on the SEB recommendations.

The IV&V Facility drafts the Level II plan. As well as defining the funding levels for on-going initiatives, the approved Level II plan serves as Code Q's selection of proposals for award.

6.4. Select IV&V Facility Initiatives

The IV&V Facility receives unsolicited proposals throughout the year. The IV&V Research Lead and the Director select for award proposals that offer the most benefit directly to the IV&V Facility. The unsolicited proposals that are selected for award are funded from the DDF.

6.5. Incrementally fund on-going initiatives

NASA Centers incrementally fund existing grants or contracts according to the guidance contained in the approved Level II plan. GSFC procurement incrementally funds existing contracts or grants and awards new grants or contracts for the IV&V Facility. GSFC also incrementally funds the WVU cooperative agreement for research.

6.6. Award new contracts & grants

The IV&V Facility completes technical evaluations and procurement requests to implement new initiatives for Code Q funded and DDF funded awards.

6.7. Manage initiatives

Managing initiative performance involves processing deliverables and conducting periodic performance reviews. The IV&V Facility, PI's and POC's use the CIM Tool to manage deliverables, status reports and performance reviews.

PI's conduct their proposed research and produce deliverables such as technical reports and software. Government POC's and the IV&V Facility review deliverables and accept or reject them.

The PI submits quarterly status reports to the IV&V Facility. The IV&V Facility conducts the quarterly review with the PI, the Government POC and others. During the quarterly review, the participants review and discuss the submitted reports. The outcomes of the review can include program direction from the IV&V Facility and revision of the initiative.

The IV&V Facility also conducts informal reviews of the initiative with the research team. The formal and informal performance reviews provide data for step 6.2 – evaluate on-going research.

6.8.   Publish results

Research results are published at the annual SAS and on the SARP Results Web Site (SRWS).

Each year all initiative PI's make a presentation at the annual Software Assurance Symposium. This symposium is considered the annual report to the customers. The Deputy Associate Administrator for OSMA is invited to attend and is given the opportunity to provide verbal feedback on the quality of the research. Additionally surveys are passed out to assess the quality of the Symposium. Proceedings of the Symposium are posted on the IV&V Facility web site.

The IV&V Facility publishes deliverables that will provide significant value to the software assurance community, as well as the software engineering community. The IV&V Facility publishes them on the SARP Results Web Site that resides on the IV&V Facility web site. Prior to publishing results, the IV&V Facility ensures that appropriate public release authorization has been obtained.

7.0   Metrics

The IV&V Facility uses the CIM Tool to track planned vs. actual progress of initiatives. The tool maintains a database of proposals, evaluations, initiatives, deliverables, and reviews. For deliverables, the CIM Tool tracks due date, submittal date, review dates, and accept/reject/further evaluation decisions. For initiative performance reviews, the CIM Tool tracks planned date, scheduled date, held or cancelled status, and review participants, minutes and action items. Also for initiative performance reviews, the CIM Tool maintains initiative quarterly technical and financial reports.

8.0   Records

The following records, as shown in Figure 8-1, are generated and managed in accordance with IVV 16 and reference to NPG 1441.1, NASA Records Retention Schedules.

Document Name and Identification Number	User Responsible for Record Retention	Retention Requirement	Location
OSMA SARP Level I Technical Program Plan	Research Lead	Destroy 3 years after Project Life	Project File
Software Assurance NASA Research Announcement	Research Lead	Destroy 3 years after Project Life	Project File
Proposal Evaluation Plan	Research Lead	Destroy 3 years after Project Life	CIM Tool Archives
Proposals	Research Lead	Destroy 3 years after Project Life	CIM Tool Archives
OSMA Software Program Level II Operating Plan	Research Lead	Destroy 3 years after Project Life	Project File
Letter of approval for CI's and UI's	Research Lead	Destroy 3 years after Project Life	Project File
Grants and Contracts	Research Lead	Destroy 3 years after Project Life	Project File
Approved CI/UI/FI Deliverables	Research Lead	Permanent	Project File

Figure 8-1: Records Generated and Managed